DETAILED ACTION

Examiner's Note regarding Restart Time Period

1. The final rejection filed 1/5/2010 was filed with an error in the office action wherein the Examiner inadvertently sent the non amended work to the office action response. The following is the appropriate and intended response for the applicant's documents filed on 10/13/2009. The time period for response has thus been restarted to accommodate for the error and Examiner apologizes for the delay.

The following is the proper Final rejection response:

Response to Arguments

2. Applicant's arguments filed 10/13/2009 have been fully considered but they are not persuasive. The examiner thoroughly reviewed the applicant's arguments but firmly believes that the cited reference reasonably and properly meets the claimed limitation as rejected.

Applicant's arguments: Applicant has argued that the combination of references Awater, Schenk, and Henkel are not properly combined and thus the application is in condition for allowance.

Examiner's response: In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The examiner has thoroughly reviewed the provided response to the office action but firmly believes that the provided rejection is proper. The applicant's response seems to focus on the application of redundant and non redundant PAR reduction. While the individual references may teach different means, they still are focused on the same scope and desired outcome, that outcome being a reduced PAR/crest factor. This, the examiner maintains that it would be obvious to one of ordinary skill in the art to utilize known functional designs within a common scope in combination to achieve a desired outcome. Therefore the grounds of rejection have been maintained.

Response to Amendment

3. Examiner notes that in the claims filed on 10/13/2009 that claims 9, 10, 15, 20 and 24 -27 are cancelled along with claims 1-7 which were previously cancelled.

Claim Objections

4. Claims 21 and 23 are objected to because of the following informalities: These claims are listed as dependent on claim 20, which has been cancelled. For the purpose of examination these claims are considered dependent on claim 16.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 8, 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater et al. (herein after Awater) (US Patent 6,175,551 B1, see IDS) in view of Schenk (US Patent 6,529,925 B1, see IDS) and Henkel et al. (herein after Henkel) (US Publication "PAR reduction revisited: an extension of Tellado's method", see IDS).

Re claim 8 Awater discloses a method for reducing the crest factor of a data symbol to be transmitted in a multi-carrier data transmission system (Col. 1 line 17-51), the data symbol being a function of a plurality of signals provided within a predetermined data frame (Col. 1 line 17-37), each of the plurality of signals allocated to a carrier (Col. 1 line 17-37), each carrier occupying at least one frequency from a transmit data spectrum (Col. 1 line 17-37), the method comprising: receiving the predetermined data frame, the predetermined data frame exhibiting the data symbol and a cyclic prefix which is derived from a part of the data symbol (Col. 3 line 54-Col. 4 line 13); and performing crest factor reduction corresponding to the predetermined data frame based at least in part on peak values within the cyclic prefix of the predetermined data frame (Col. 3 line 54-Col. 4 line 30; Figure 2 elements 30, 34).

Within the disclosure and cited areas, Awater does not specifically discuss reducing the crest factor of the multi-carrier signal. However, based on the disclosure of the applicant at Paragraph 0006 of the current application, the PAP ratio is directly correlated to the derivation of the crest factor; therefore it would have been obvious to one of ordinary skill in the art that the PAP ratio reduction would result in the reduction of the crest factor for the multi-carrier signal.

Further the disclosure of Awater fails to explicitly disclose (1) the limitation of at least one carrier being reserved which is not provided for the data transmission; and (2) (a) filtering the data symbol and the cyclic prefix; (b) determining whether a time-domain function of the data symbol and of the cyclic prefix within the predetermined data frame exhibits at least one peak value that exceeds a first threshold; (c) determining an amplitude of an exhibited peak value and an associated position within the predetermined data frame; (d) generating a correction function by scaling and transposing a sample correction function in dependence on the amplitude and associated position of the exhibited peak value; using the at least one carrier which is not available for data transmission for generating the sample correction function in the time domain; and (e) modifying the data symbol to be transmitted by superimposing the correction function.

Regarding item (1) this method is however rendered obvious by the disclosure of Schenk. Schenk discloses where at least one carrier being reserved which is not provided for the data transmission (Col. 1 lines 48-60) as being a well known tactic in the area of multi-carrier communication as a means for providing an initial reduction to the crest factor.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the disclosure of Awater in order to incorporate the processing method of Schenk wherein carrier reservation is utilized in to use this well known method to provide further reduction of the crest factor for the multi-carrier signal.

Regarding item (2) this method is however disclosed by Henkel. Henkel discloses the method comprising: (a) filtering the data symbol and the cyclic prefix (Page 31-2, Section II Paragraphs 1-2; Section IV); (b) determining whether a time-domain function of the data symbol and of the cyclic prefix within the predetermined data frame exhibits at least one peak value that exceeds a first threshold (Page 31-1 column 2); (c) determining an amplitude of an exhibited peak value and an associated position within the predetermined data frame (Page 31-2 Col. 2); (d) generating a correction function by scaling and transposing a sample correction function in dependence on the amplitude and associated position of the exhibited peak value (Page 31-2 Col. 1-2); using the at least one carrier which is not available for data transmission for generating the sample correction function in the time domain (Page 31-2 Section II); and (e) modifying the data symbol to be transmitted by superimposing the correction function (Page 31-2 - Page 31-3 Col. 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate peak detections and reduction method as disclosed by Henkel within the combined crest factor reduction method disclosed by Awater in order to gain the added benefit of further detail and efficiency in the peak reduction processing methods.

Re Claim 11, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 8, Henkel further discloses the method further comprising repeating steps (b) - (e) until the data symbol no longer exhibits any peak

values above the first threshold and/or a predetermined number of iteration steps has been reached (Page 31-1, Col. 2 last paragraph).

Re Claim 12, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 8, Henkel further discloses the method comprising repeating steps (a) - (e) are repeated until the data symbol no longer exhibits any peak values above the first threshold and/or a predetermined number of iteration steps has been reached, the data symbol modified by the correction function being used for the filtering in step (a) (Page 31-1, Col. 2 last paragraph).

Re Claim 13, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 8, Henkel further discloses the method further comprising oversampling at least the data symbol prior to step (b) (Page 31-2 Section II).

Re Claim 14, the combined disclosure of Awater, Schenk and Henkel as a whole disclose the method as claimed in claim 8, Henkel further discloses the method wherein step (d) further comprises using a dirac-like function as the sample correction function (Page 31-2 Section II).

7. **Claims 16-19, 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awater in view of Henkel.**

Re claim 16 Awater discloses a method for reducing the crest factor of a data symbol to be transmitted in a multi-carrier data transmission system (Col. 1 line 17-51), the data symbol being a function of a plurality of signals provided within a predetermined data frame (Col. 1 line 17-37), each of the plurality of signals allocated to a carrier (Col. 1 line 17-37), each carrier occupying at least one frequency from a transmit data spectrum (Col. 1 line 17-37), the method comprising: (a) receiving the predetermined data frame, the predetermined data frame having the data symbol and a prefix which is derived from a part of the data symbol (Col. 3 line 54-Col. 4 line 13); and (b) performing crest factor reduction corresponding to the predetermined data frame based at least in part on peak values within the cyclic prefix of the predetermined data frame (Col. 3 line 54-Col. 4 line 30; Figure 2 elements 30, 34).

Within the disclosure and cited areas, Awater does not specifically discuss reducing the crest factor of the multi-carrier signal. However, based on the disclosure of the applicant at Paragraph 0006 of the current application, the PAP ratio is directly correlated to the derivation of the crest factor; therefore it would have been obvious to one of ordinary skill in the art that the PAP ratio reduction would result in the reduction of the crest factor for the multi-carrier signal.

Awater further fails to explicitly disclose wherein step (b) further comprises determining an amplitude of an identified peak value and an associated position within the predetermined data frame; and generating a correction function by scaling and transposing a sample correction function in dependence on the amplitude and associated position of the identified peak value and using the at least one carrier which

is not available for data transmission for generating the sample correction function in the time domain.

This design is however disclosed by Henkel. Henkel discloses wherein wherein step (b) further comprises determining an amplitude of an identified peak value and an associated position within the predetermined data frame; and generating a correction function by scaling and transposing a sample correction function in dependence on the amplitude and associated position of the identified peak value (Section II) and using the at least one carrier which is not available for data transmission for generating the sample correction function in the time domain (Page 31-2 Col. 2).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate peak detections and reduction method as disclosed by Henkel within the combined crest factor reduction method disclosed by Awater in order to gain the added benefit of further detail and efficiency in the peak reduction processing methods.

Re claim 17, the combined disclosure of Awater and Henkel disclose the method as claimed in claim 16, Awater further discloses wherein the step (b) further comprises searching for peak values exceeding a first threshold in the data symbol and in the cyclic prefix (Col. 4 lines 14-30).

Re claim 18; the combined disclosure of Awater and Henkel disclose the method as claimed in claim 17, Henkel further discloses the method wherein in step (b) further

comprises filtering the data symbol and the cyclic prefix over the predetermined data frame prior to searching for peak values (Section II; IV).

Re Claim 19, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 18, Henkel further discloses the method wherein filtering the data symbol and cyclic prefix further comprises using filtering characteristics corresponding to a downstream filter of the multi-carrier data transmission system (Section II; IV).

Re Claim 21, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 20 (16), Henkel further discloses the method wherein step (b) further comprises modifying the data symbol to be transmitted by superimposing the correction function (Section II).

Re Claim 22, Awater discloses the method as claimed in claim 17, but fails to explicitly disclose wherein step (b) further comprises oversampling at least the data symbol prior to searching for peak values.

This method is however disclosed by Henkel. Henkel discloses the method wherein step (b) further comprises oversampling at least the data symbol prior to searching for peak values (Section II).

Re Claim 23, the combined disclosures of Awater and Henkel disclose the method as claimed in claim 20 (16), Henkel further discloses the method wherein step (d) further comprises using a dirac-like function as the sample correction function (Section II).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL R. NEFF whose telephone number is (571)270-1848. The examiner can normally be reached on Monday - Friday 8:00am - 4:30pm EST ALT Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571)272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MICHAEL R. NEFF/

Examiner, Art Unit 2611

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Supervisory Patent Examiner, Art Unit 2611